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Weighing the snow core to determine the water content

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for
RIO GRANDE DRAINAGE BASIN

MAY 1, 1945

By
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado and New Mexico and other Federal, State and local organizations.



MAY 1, 1945

WATER SUPPLY OUTLOOK

RIO GRANDE

No material change occurred in the water supply outlook during April. The prospects for an adequate irrigation supply are quite satisfactory. Reservoir storage has increased over the past month. The Rio Grande, Santa Maria, Terraco, Continental and El Vado reservoirs are expected to fill and Elephant Butte to 75 percent of capacity.

RIO GRANDE: During April over the watershed of the Rio Grande storms added to the snow cover at the high elevations while on the lower areas the water content of the snow is less than it was a month ago. For ten courses on the headwaters of this stream, in Colorado, the average water content, April 1st, was 13.9 inches and it is now 11.7. During the past month the accumulation of water in the snow on Wolf Creek Pass was nearly $3\frac{1}{2}$ inches and at Summitville and on Cumbres Pass there was added approximately 2 inches. The increase in the water storage in the high snow will aid in sustaining the flow in the river later in the summer months. There was a deficiency of April snowfall over the lower elevations.

On the Rio Grande drainage in northern New Mexico the past month's precipitation has been normal with some addition to the snow cover at the high elevations. The snow on the lower mountain slopes is melting and stream flow increasing. In the tributary streams the runoff will be normal this season with the exception of Red River which is expected to reach near flood stage in the early part of the season.

The outlook for the coming irrigation water supply for the Rio Grande has not materially changed since April first. Reservoir storage in the San Luis valley has improved during the past month and on the average is now 50 percent more than it was at this time last year. In the Elephant Butte and Caballo reservoirs the total storage is now 7 percent more than a year ago. Over the San Luis valley the soil moisture throughout the irrigated districts has improved during the past month and is now reported to be good to excellent. Because of cool weather in this area the streamflow is somewhat below normal. At this time there is no snow on the valley floor.

It is not likely that the melting of the mountain snows will result in unusually high peak flows in the lower valley unless favorable temperatures prevail over the headwaters of the river. It is estimated that the average flow of the Rio Grande at Otowi Bridge, near Espanola, during May, will be 8,500 second-feet. The melting of the low snow is now occurring and the stage of the river has been rising since about April 15th. For the Rio Grande Conservancy District the soil moisture and the range and crop conditions also, are good at this time. Crops in the lower Rio Grande valley are in need of rain.

RIO GAMA: The water supply outlook for the coming season remains very favorable. Snow conditions during the month have been generally normal with some accumulation of snow at the higher elevations of the watershed. The El Vado reservoir now has 140,000 acre-feet of water in storage. During April the filling increased 40,000 acre-feet and it is fully expected that the runoff during May and June will bring the reservoir to the full capacity of 226,000.

RIO PECOS: The prospects for runoff in this stream from snow cover during the coming season are still quite favorable. Mountain snow cover at the higher elevations remains much the same as that a month ago. On the White Mountains, north of Alamogordo the snow cover is reported to be below normal. For the Carlsbad Project the soil moisture continues to be somewhat below normal, especially over the range lands. Grazing conditions are normal with livestock doing well. Stream flow is low in the lower valley of the Pecos. Crops on the project lands under irrigation are starting off well but seasonably late.

CANADIAN RIVER: Snow conditions on the headwaters of this stream, in northern New Mexico, are normal for this time of year and the prospects are generally favorable for ample irrigation water during the early part of the summer. In the vicinity of Tucumcari the soil moisture over the area is somewhat subnormal, however, range conditions are good and the crop outlook fairly good. Stream flow is low. The total storage in the Conchas reservoir is now 341,000 acre-feet. Last year at this time it was 397,000. Because of the available reservoir storage there will be no water shortage on the project lands served by this reservoir.

GROUND WATER

Throughout the irrigated areas of New Mexico ground-water levels are normal or slightly below at the present time.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for
RIO GRANDE BASIN

May 1, 1945

PRECIPITATION DATA

WATERSHED	STATE	Precipitation October 1 to April 30 Inches	Departure from Normal Inches	Precipitation April Inches	Departure from Normal Inches
Canadian	New Mexico	5.23	-0.17	0.95	-0.21
Rio Grande	Colorado	10.46	+2.18	1.89	+0.64
Rio Grande (N)	New Mexico	9.29	+1.43	1.39	+0.63
Rio Grande (S)	New Mexico	4.34	-0.05	0.42	-0.16
Pecos	New Mexico	4.18	-1.13	0.23	-0.64

Precipitation was generally below normal during April except in northern New Mexico and the San Luis Valley. The same is true for the accumulated precipitation since October 1. For the San Luis Valley the accumulated precipitation is 2.18 inches above normal.

SUMMARY OF MAY 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHED	Snow Depth		Water Content			Number Courses in Average		Snow Density			1945 Water Content in percent of	
	Nine Year Avg.* In.	1944 In.	1945 In.	Nine Year Avg.* In.	1944 In.	1945 In.	10	1944 Year Avg.* Percent	1945 Year Avg.* Percent	1944 Year Avg.* Percent	1945 Year Avg.* Percent	1944 Year Avg.* Percent
Rio Grande	25.3	42.5	30.1	10.0	15.1	11.7	10	40	36	117	78	
Chama River												
Pecos River												
Canadian River												

*Some for shorter periods

RIO GRANDE WATERSHED
Summary of Federal and State Cooperative Snow Surveys
Issued May 10, 1945, at Fort Collins, Colorado.

Main Drainage		Local	State	Location		Elev.	National Forest	May 1 Snow Cover Measurements					
and		Drainage		Locality	Descrip- tion			Av. Snow Depth	Av. Snow Content	Av. Snow Depth	Av. Snow Content	Av. Snow Depth	Av. Snow Content
No.	Snow Course							1944	1945	1944	1945		
RIO GRANDE													
26	Wolf Creek Pass	South Fork	Colo.	Wolf Cr. Pass	4-37N-2E	10000	Rio Grande	In. 63.9	In. 101.4	In. 79.1	In. 28.4		
27	Upper Rio Grande	Pio Grande	"	Rio Grande Res.	13-40N-4W	9350	"	7.2	37.5	0.0	2.5		
47	Silver Lakes	Alamosa R.	"	1mi. S. Silver L.	15-36N-5E	9600	"	3.9	12.0	0.0	1.4		
49	River Springs	Conejos R.	"	10mi. W. Mogote	25-33N-6E	9300	"	4.6	10.2	9.8	1.5		
74	La Veta Pass #2	SanCristoCr.	"	La Veta Pass	22-28S-70W	9300	SanCristoCr.	12.7	35.3	22.3	4.7		
76	Summitville	Wightman Cr.	"	Summitville	30-37N-4E	11500	Rio Grande	68.7	93.6	73.1	23.9		
77	Cumbres Pass #2	Los Pinos R.	"	Cumbres Pass	17-32N-5E	10000	"	47.6	65.4	79.7	21.9		
80	Santa Maria	M. Clear Cr.	"	Santa Maria Res.	8-41N-2W	9700	"	5.1	19.7	0.0	2.0		
82	Culebra	Culebra R.	"	12mi. E. San Luis	37-2N-105.2W	10000	SanCristoCr.	33.8	45.3	36.8	12.0		
84	Fort Garland	Big Ute Cr.	"	6mi. N. Ft. Garland	13-29N-72W	8200	"	5.8	4.6	0.0	1.6		
1	Red River	Red River	N. Mex.	6mi. SE. Red River	29-28N-15E	9500	Carson	32.1	—	—	—		
2	Taos Canyon	Rio de Taos	"	14mi. E. Taos	10-25N-15E	9000	"	18.8	—	—	—		
4	Aspen Grove	Rio En Medio	"	10mi. NE. Santa Fe	12-18N-10E	9100	Santa Fe	—	—	—	—		
5	Leo Ranch	Jemez Cr.	"	5mi. NW. Bland	3-18N-4E	9050	"	—	—	—	—		
6	Canjilon	Canjilon Cr.	"	8mi. NE. Canjilon	4-26N-6E	9500	Carson	—	—	—	—		
9	Hematite Park*	Red River	"	3mi. SE. Red R.	8-28N-15E	9500	Carson	25.1	—	—	—		
12	Tres Ritos	Agua Piedra	"	7mi. W. Holman	23-22N-13E	9000	"	—	—	—	—		
15	Pay Role	Rock Creek	"	4mi. SE. Hopewell	16-28N-7E	10000	"	—	—	—	—		
16	Jicarilla	Rock Lake Cr.	"	15mi. S. Dulce	9-29N-1W	8500	Jicarilla R.	—	—	—	—		
17	Chama Divide	Willow Creek	"	6mi. W. Chama	36.9N-106.7W	7750	Off Forest	—	—	—	—		
18	Chamita	Chamita Cr.	"	6mi. NW. Chama	36.9N-106.7W	8500	"	—	—	—	—		
19	Big Tesuque	Big TesuqueCr.	"	10mi. NE. Santa Fe	17-18N-11E	10000	Santa Fe	—	—	—	—		
20	Panchuela #2	Panchuela Cr.	"	1mi. N. Cowles	34-19N-12E	8500	Santa Fe	—	—	—	—		
							Average for drainage		25.3	42.5	30.1	10.0	
									15.1	10.3	11.7		
CANADIAN													
9	Hematite Park	Moreno Cr.	N. Mex.	3mi. SE. Red R.	8-28N-15E	9500	Carson	25.1	—	—	—		
10	Ocate Mesa	Ocate Creek	"	3mi. E. Black L.	25-24N-16E	9200	Off Forest	—	—	—	—		
							Average for drainage						

*On adjacent drainage

@Average for period of record

RESERVOIR STORAGE

Reservoir Storage in Thousands of Acre-Feet, Rio Grande Drainage, as of May 1, for the Years 1936-1945, inclusive. (Based on data from the State Engineer of Colorado, U. S. Bureau of Reclamation and other agencies).
A = Percentage of capacity. B = Percentage of 10-year average. C = Percentage of filling forecast for 1945.

Reservoir	Capacity Ac-ft.	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	10-yr. Avg. β Ac-ft.	A %	B %	C %
RIO GRANDE DRAINAGE															
Rio Grande	45.8	23.6	16.2	17.5	36.7	4.7	8.4	49.1	7.8	13.1	22.3	19.9	49	112	100
Santa Maria	45.0	6.9	9.5	10.8	15.1	3.8	4.6	26.9	15.4	6.3	15.7	11.6	37	144	100
Sanchez	103.2	13.8	17.6	19.2	22.9	10.9	8.6	37.9	35.0	16.6	12.1	19.5	12	62	25
Terrace	17.7	6.4	4.5	9.6	7.5	1.7	3.8	9.1	1.3	5.1	3.8	5.3	21	72	100
Continental	26.7	3.3	0.5	4.0	4.3	1.0	0.0	10.0	16.2	8.2	19.5	6.7	73	291	100
Elephant															
Butte	2273.7	782.5	917.1	1099.0	1324.0	803.2	593.5	2126.0	1653.1	1140.4	1212.9	1165.7	53	104	75
Caballo	365.0	--	0.0	14.5	44.5	17.3	67.8	263.1	238.3	195.7	217.4	132.3	59	164	--
El Vado	226.0	--	--	148.6	87.4	113.7	129.8	155.5	127.0	72.3	140.0	121.8	62	115	100
CANADIAN DRAINAGE															
Conchas	600.0	--	--	--	--	80.6	155.5	390.6	390.3	397.0	341.2	292.5	57	116	--
PECOS DRAINAGE															
Alamogordo	148.0	--	--	11.2	95.6	50.2	41.4	129.8	89.4	25.5	7.0 ^a	56.2	5	12	--
McMillan	32.3	11.0	13.3	6.7	14.7	9.8	35.9	30.8	20.3	11.0	8.6	16.2	27	53	--
Avalon	7.0	3.4	1.9	1.8	3.0	0.8	4.7	5.1	0.8	1.1	2.4	2.5	34	96	--

β Some averages for shorter periods

*Based on capacity of 2,407,100 acre-feet

^a Unavailable storage

(5362-45)

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer
Wyoming State Engineer
Utah State Engineer
New Mexico State Engineer
Montana State Engineer
Nebraska State Engineer
Colorado Experiment Station
Colorado Extension Service
Montana Experiment Station
Utah Experiment Station

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Interior
Bureau of Reclamation
Indian Service
Geological Survey
National Park Service
Department of Commerce
Weather Bureau
War Department
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company
Western Colorado Power Company
Montana Power Company
Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

City of Bozeman
City of Denver
City of Boulder

WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association
Arkansas Valley Ditch Association
Colorado River Water Conservation District

IRRIGATION PROJECTS

Farmers Reservoir and Irrigation Company
San Luis Valley Irrigation District
Santa Maria Reservoir Company
Costilla Land Company
Uncompahgre Valley Water Users' Association
Wyoming Development Company
Goshen Irrigation District
Kendrick Project
Pathfinder Irrigation District
Salt River Valley Water Users' Association
San Carlos Irrigation and Drainage District

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